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# The Advantages of Airborne Lidar Bathymetry

Charles de Jongh 8<sup>th</sup> December 2022 Hydro 22 Conference







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Serving the world with insights beyond data, Field is one of Europe's leading geodata, collection and analysis companies.





#### Airborne Lidar Bathymetry – what happens?



- Field

Enlightened bottom area

Water

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#### Airborne Lidar Bathymetry – what happens?



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#### Airborne Lidar Bathymetry – what happens?



- This results in a detailed waveform for each laser pulse.
- The depth of the water bottom can be defined based on the difference in time between photons hitting the water surface and the water bottom.



Water

**Bottom** 

Enlightened bottom area



# **Advantages of Airborne Lidar Bathymetry**

- Fast, accurate & cost-effective hydrographic survey method.
- Seamless mapping of land & water in the coastal zone, rivers and lakes.
- Ability to measure about 3 times the visible water depth (depending on the sensor type).
- More effective survey technique in shallow areas than 'traditional' multibeam echosounder technology. ALB & MBES are complementary to each other.



# Field's CZMIL SuperNova Sensor

- CZMIL: Coastal Zone Mapping and Imaging Lidar. Deep penetrating sensor with powerful laser.
- CZMIL sensor type originally developed by US Army Corps of Engineers & Teledyne Optech.
- **CZMIL SuperNova** (2021) is a new generation bathymetric lidar sensor with many improvements, e.g.:
  - Best penetration of deep and turbid waters on the market (>3x Secchi depth).
  - High point density (~8 points per m2) & SmartSpacing technology.
  - High accuracy, reaching IHO Special Order.
  - Customized survey setups for maximum performance in wide range of environments.
- Field is the only European company with a CZMIL SuperNova sensor.





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## Field Airborne Lidar Bathymetry Equipment



2x Cessna 208b Grand Caravan aircraft with 2 hatches. ALB Speed: 120-140 knots (220-260km/h). ALB Flying Height: 400-600m.



RGB Camera: PhaseOne iXM-RS150F, 150 megapixel, 3cm resolution.

Second hatch for other sensors, here for example hyperspectral cameras Hyspex VNIR-1800 & SWIR-384 Bathymetric lidar: CZMIL SuperNova (Applanix POS AV GNSS & IMU integrated)

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## Airborne Lidar Bathymetry survey with a CZMIL sensor at night



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# Field Airborne Lidar Bathymetry Services: From Data to Knowledge



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#### Turbidity (water clarity) in European waters



Average turbidity based on diffuse attenuation coefficient for downwelling irradiance at 490 nm (Kd\_490) in August 2022, derived from sensors on 4 satellites. Source: NOAA Star Ocean Color.

#### Field bathymetric lidar use case: coastal survey around Stavanger, Norway



# Survey results: Bathymetry

0m

-30m

Islands of Fjøløy & Klosterøy: CZMIL SuperNova high density point cloud showing land & water bottom, with consistent depths up to 30 meters (deeper is classified information)

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# Survey results: Bathymetry

Islands of Fjøløy & Klosterøy: sea surface 'removed' so the bathymetry of the area becomes visible.



## Survey area with multibeam echosounder: ~8 survey days





## Survey same area with airborne lidar bathymetry: ~2 survey <u>hours</u> – very efficient





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#### ALB Added value: Mapping of marine vegetation



### Field bathymetric lidar use case: Helligvær archipelago (northern Norway)



#### Field bathymetric lidar use case: coastal survey of Catalunya





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# Conclusion

 Using airborne bathymetric lidar technology the coastal zone, lakes and rivers can be surveyed accurately, efficiently & cost-effective.

- With the CZMIL SuperNova Field has a top-notch bathymetric lidar sensor, delivering very good results.
- Field is looking forward to use this sensor to survey more waters and is ready to provide its services wherever they are required!



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# Airborne Lidar Bathymetry Survey Services

Contact: Charles de Jongh +47 465 77 931 Charles.deJongh@Field.group Field.Group

